

MARGINAL BENEFIT INCIDENCE OF SOCIAL SPENDING IN THAILAND: PANEL EVIDENCE FROM PROVINCIAL EDUCATION, HEALTH, AND WELFARE BUDGETS*

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Abstract

This research article aims to: 1) estimate how the utilization of public services across income quintiles responds to changes in provincial social spending; 2) derive the marginal benefit incidence (MBI) of additional public expenditure on education, health, and welfare; 3) draw policy implications for restructuring Thailand's social sector budget under fiscal constraints to enhance its redistributive impact. The researchers conduct a quantitative panel data research study collecting data from household socio-economic surveys and fiscal records across 30 Thai provinces (from 2007 to 2023); analyze the data using fixed-effects panel regression models to estimate quintile-specific elasticities and Concentration Index (CI) measurements. The research results found that:

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1) Additional spending on education and welfare is clearly pro-poor at the margin, with the poorest quintile receiving marginal benefits 36% higher than the average incidence ($R_1 = 1.36$).

2) The marginal incidence of health spending is neutrally distributed, indicating that despite universal coverage, lower-income households still face substantial non-financial barriers to access.

3) Policy simulations reveal that a geographic reallocation of budgets from high-income to low-income provinces generates an 83% progressivity gain, proving significantly more effective at reducing inequality than a uniform expansion of resources.

Keywords: marginal benefit incidence, social spending, income distribution

Introduction

Thailand's social spending on education, health, and welfare has grown substantially as a share of the budget, aimed at building human capital, reducing poverty, and narrowing inequality (Gebregziabher & Niño-Zarazúa, 2014). A pivotal inquiry persists: do increases in marginal spending advantage the impoverished, or do affluent households reap the rewards? As fiscal constraints intensify, policymakers must determine both the budget magnitude and the allocation of each additional baht for optimal equity outcomes. The urgency of analyzing the "marginal" impact of this spending is particularly acute as Thailand grapples with the "middle-income trap" and the fiscal pressures of a rapidly aging society (World Bank, 2021). In this context, ensuring that marginal benefits effectively reach the poor is no longer just a matter of social equity, but a structural necessity for maintaining long-term economic stability (Buracom, 2016; Davoodi et al., 2012; Phongpaichit & Baker, 2015; Wudil et al., 2023).

International evidence from benefit incidence analysis (BIA) demonstrates varied outcomes. Basic education and health services typically favor lower-

income groups, whereas tertiary education and hospital services benefit wealthier populations. In Thailand, Buracom (2016) indicates that spending on primary and secondary education has become increasingly favorable to lower-income groups, while tertiary education remains biased towards the affluent; public hospital expenditures continue to favor wealthier individuals despite the expansion of universal health coverage; and welfare programs show progressively targeted distributions. (Davoodi et al., 2012; Weiss, 2005)

They found that and Study Motivation: Three significant gaps persist in the literature. First, because existing Thai studies rely on isolated cross-sections, they are unable to account for changes in provincial budgets over time and fail to recognize small improvements in services after reforms. Second, traditional Benefit Incidence Analysis (BIA) emphasizes the average distribution of benefits rather than the marginal incidence, a crucial distinction for policymakers in resource allocation. Third, national-level evaluations disregard provincial variety in budget composition and utilization. This neglect misses a critical theoretical link to the political economy of benefit capture following Thailand's 1999 Decentralization Act (Determining Plans and Process of Decentralization to Local Government Organization Act B.E. 2542, 1999). Provincial heterogeneity is not merely a geographic data point, but reflects differences in local institutional capacity and political dynamics that dictate why certain provinces might capture more benefits at the margin than others, thus affecting disadvantaged communities unevenly (Sagarik, 2014; Buracom, 2011, 2016; Suwanmala & Weist, 2008).

Study Objectives and Approach: This study addresses these gaps by extending BIA to marginal benefit incidence (MBI) analysis using provincial panel data. We combine 17 years of provincial budget data (education, health, welfare) for 30 Thai provinces with household survey information on school enrollment, public health utilization, and welfare receipt by income quintile. Using fixed-effects panel regression, we estimate quintile-specific elasticities—how service

use responds to spending changes—then infer marginal benefit distribution across income groups.

Objectives

1. To estimate how the use of public education, health, and welfare services by different income quintiles responds to changes in provincial social spending in Thailand.

2. To derive the marginal benefit incidence of additional government spending on education, health, and welfare across income groups at the provincial level.

3. To draw policy implications for the composition and targeting of Thailand's social sector budget under fiscal constraints, with a view to enhancing its redistributive impact.

Research Question

When Thailand increases social spending, how and why do marginal benefit capture patterns differ significantly between specific sectors—particularly the contrasting dynamics of education and health—and to what extent do provincial institutional capacities and the composition of social spending shape the equity effects of these additional resources?

Literature Review

Thematic Evolution: From Average to Marginal Benefit Incidence

The methodological trajectory of measuring fiscal equity has shifted fundamentally from standard Benefit Incidence Analysis (BIA) to Marginal Benefit Incidence (MBI). Traditional BIA links government spending records with household survey data to estimate how in-kind subsidies are currently distributed, assuming unit public cost proxies the benefit received (Demery, 2000; Davoodi et al., 2003). However, a significant limitation of standard BIA is its static

nature—it describes who benefits from the existing stock of spending but fails to capture behavioral responses to fiscal changes (Ajwad & Wodon, 2004). To address this, MBI methodologies were developed to estimate how service utilization responds dynamically to budget fluctuations, allowing analysts to determine whether incremental resources are more or less pro-poor than existing allocations (Lanjouw & Ravallion, 1999; Younger, 2003, 2012).

Empirical Evidence and the Digital/Quality Divide

Global empirical applications reveal consistent stylized facts: primary education and basic health services are mildly pro-poor or neutral, while tertiary education, hospital care, and traditional network infrastructure tend to be strongly pro-rich (Alabi et al., 2011; Chen et al., 2016; Kruse et al., 2012; Mitra, 2015; World Bank, 2003). However, recent literature emphasizes that purely cost-centered advantages obscure the critical dimensions of service quality and the emerging "digital divide." Access to welfare is no longer just about geographic proximity; it increasingly depends on digital literacy and connectivity (World Bank, 2021). Furthermore, equal unit subsidies do not equate to equal learning or health outcomes, as service quality varies drastically between urban centers and rural peripheries. Consequently, failing to account for quality variations and digital accessibility mechanisms creates a significant conceptual mismatch when evaluating the true redistributive impact of social spending.

Gaps This Study Addresses

While prior research documents average benefit distribution comprehensively, fewer studies examine marginal incidence—the distribution of incremental spending. This distinction is crucial for policymakers: even if current spending is poorly targeted, marginal spending might be highly pro-poor (reaching underserved populations) or might be pro-rich (saturation effects).

Furthermore, traditional cost-centered approaches frequently fail to address the post-2020 economic landscape. By assuming that the unit cost equates to the benefit received, prior studies neglect crucial variations in service

quality and the emerging "digital divide." As welfare access increasingly relies on digital technologies and literacy, treating subsidies purely in financial terms obscures the actual welfare outcomes for marginalized groups.

Additionally, most cross-country studies treat education and health monolithically; they rarely examine sector-specific mechanisms explaining why some services reach the poor better than others at the margin. Finally, provincial-level variation in Thailand has not yet been systematically analyzed for marginal incidence, despite the 1999 decentralization reforms creating substantial spending heterogeneity and differing institutional capacities across regions. This study explicitly addresses these methodological, qualitative, and spatial voids.

Limitations of Standard BIA

Traditional benefit incidence analysis has been criticized for three main reasons. Firstly, it offers a limited view of current distribution, neglecting the implications of spending changes which are vital for policymakers. Lipton and Ravallion observed that political economy can lead to scenarios where existing expenditures benefit the affluent while additional spending assists the impoverished, or the opposite. (Davoodi et al., 2003). *Second*, standard BIA equated spending with benefit, ignoring consumer preferences and behavioral responses. Changes in fees, quality, or accessibility reshape demand and benefit distribution even when average utilization patterns appear stable. *Third*, BIA treated services as uniform, failing to distinguish between primary versus tertiary education, recurrent versus capital spending, or different infrastructure types—which typically benefit different income groups. *Finally*, Data deficiencies in developing nations resulted in the exclusion or considerable assumptions regarding key expenditure sectors. (Alabi et al., 2011; Younger, 2012)

Marginal Benefit Incidence Analysis: Methodological Advances

In reaction to this issue, scholars have devised marginal benefit incidence (MBI) methodologies to evaluate the beneficiaries of fluctuations in fiscal

allocations. Lanjouw and Ravallion pioneered a regression approach exploiting geographic variation in program coverage: they estimated how participation by income quintile responds to differences in higher-level administrative coverage, interpreting coefficients as marginal odds of participation. This method assumes cross-sectional geographic differences proxy temporal changes within a single area (Younger, 2012).

Ajwad and Wodon expanded the paradigm by delineating quintiles based on local income and implementing it in the domains of education, water, power, and sanitation in Bolivia and Paraguay. They discovered that the marginal benefits of education are pro-poor, as impoverished and middle-income municipalities experience greater gains with expanded coverage, particularly in regions where affluent populations already have high access. Conversely, the benefits of infrastructure are pro-rich, with wealthier areas reaping more advantages from the expansion of piped water, electricity, and sewage systems due to lower connection costs and pre-existing access. Younger suggested other approaches—analyzing benefit shares across time and employing demand models for compensating variation—demonstrating that "marginal incidence" is contingent upon the particular policy change assessed (Ajwad & Wodon, 2004; Younger, 2012).

Robust Findings Across Studies

The literature converges on five stylized facts. First, primary education and basic health spending are rarely sharply pro-poor; they distribute roughly proportionally to population share or favor the middle class, while higher education and hospital care clearly favor the wealthy. Second, infrastructure subsidies (water, electricity, sewerage) are most regressive because poor households lack network connections. Third, marginal benefits are often more pro-poor than average benefits when non-poor access is high (especially primary education and preventive health), but NOT for infrastructure (technical constraints favor wealthy areas). Fourth, decentralization affects spending

distribution via local governance and transfer design. Fifth, even pro-poor marginal incidence cannot overcome large initial inequalities—additional benefits still flow mostly to the non-poor unless explicitly targeted (Kruse et al., 2009; Alabi et al., 2011; Ajwad & Wodon, 2004)

Remaining Gaps: Key gaps persist. Cost-centered advantages neglect the dimensions of quality, satisfaction, and the actual health or educational outcomes, thereby obscuring the impacts on welfare. The constraints of longitudinal microdata necessitate a dependence on cross-sectional geographic variability, thereby diminishing the robustness of causal identification. A limited number of investigations address the simultaneous incidence and efficiency—specifically, the extent to which expenditures enhance outcomes across various income strata. Lastly, the scope of coverage remains inadequate for non-social sectors and off-budget initiatives, despite their significant distributional ramifications. (Younger, 2012; Selden & Wasylenko, 1992).

Conceptual Framework

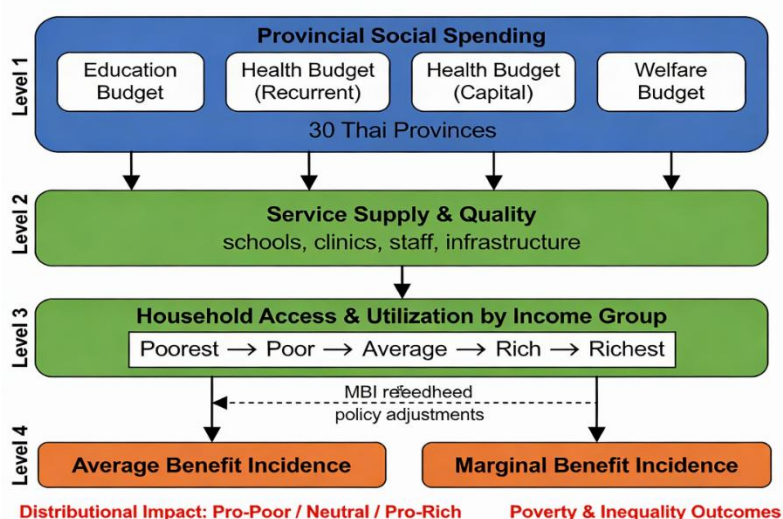


Figure 1 Research conceptual framework: Marginal Benefit Incidence of Social Spending in Thailand - Provincial Education, Health, and Welfare Budgets.

Methodology

Population and Sample

The study utilizes a panel dataset comprising 30 provinces in Thailand over a 17-year period from 2007 to 2023. The unit of analysis spans both the macroeconomic (provincial) and microeconomic (household) levels. The household-level sample is drawn from the nationally representative Thai Socio-Economic Survey (SES) conducted by the National Statistical Office (NSO, 2023), allowing households to be ranked by consumption expenditure and divided into five equal income quintiles.

Research Instruments

Given the quantitative panel data design, the primary research instruments are the structured national administrative and survey databases. These structured datasets include:

1. Fiscal Data: Provincial expenditure databases regarding education, health, and welfare, sourced directly from the Bureau of the Budget and the Ministry of Finance (Bureau of the Budget, 2023).
2. Household and Demographic Data: Datasets from the SES and the National Economic and Social Development Council (NESDC, 2023), which capture micro-level variables such as household income, consumption, demographic characteristics, and public service utilization.

Data Collection

Data collection involved the systematic compilation and merging of secondary administrative and survey data into a longitudinal provincial panel dataset. Macro-level fiscal data—specifically, provincial social spending—were collected and divided by total users to calculate the "unit subsidy" for each province and year. These data were seamlessly mapped onto micro-level household survey information, which captured self-reported service utilization,

specifically focusing on school enrollment, public hospital or clinic utilization, and the receipt of welfare assistance across the specified income quintiles.

Data Analysis

The data were analyzed using advanced panel data econometrics, following established methodologies in marginal benefit incidence literature (Ajwad & Wodon, 2007; Alabi et al., 2011; Kruse et al., 2012). The analysis was executed in two sequential stages:

Stage 1 (Average Benefit Incidence): Standard Benefit Incidence Analysis (BIA) was applied to calculate the Average Benefit Incidence (ABI) by computing each quintile's share of the total benefits. Additionally, the Concentration Index (CI) was computed to quantitatively measure the progressivity of the social spending.

Stage 2 (Marginal Benefit Incidence): Fixed-effects panel regression models were employed to estimate quintile-specific spending elasticities, which reflect the Marginal Benefit Incidence (MBI). The models rigorously controlled for household-level variables (e.g., log income, family size, education), as well as unobserved time-invariant provincial characteristics and temporal shocks using province and year fixed effects.

Robustness and Endogeneity: To resolve potential reverse causality and endogeneity, the analysis incorporated lagged spending variables and Instrumental Variables (IV) relying on exogenous provincial characteristics. Standard errors were clustered at the province level to ensure the reliability of the statistical inference.

Table 1 Data Sources

Data	Source	Variables
Fiscal Data	Bureau of Budget, Ministry of Finance	Provincial expenditure (education, health, welfare)

Household Survey	National Statistical Office (Thai SES)	Income, consumption, service utilization
Demographic Data	NSO, NESDC	Population, urbanization, province-level characteristics

Benefit allocation: $B_{ijkt} = U_{ijkt} \times S_{jkt}$ where U_{ijkt} is household i 's utilization of service k in province j year t , and $S_{jkt} = E_{jkt}/TU_{jkt}$. It is crucial to acknowledge the methodological limitation of this "Unit Subsidy" assumption. Equating the cost of provision directly with the benefit received inherently ignores variations in service quality across provinces. Consequently, while the financial incidence may appear equal, the actual welfare or human capital outcomes derived from a remote rural facility versus a well-equipped urban center may differ significantly.

Income quintiles: Households are ranked by consumption expenditure and divided into five equal groups ($q = 1$, poorest; $q = 5$, richest).

Aggregated benefits: Benefits are summed by quintile-province-year:

$$B_{q,j,t} = \sum_{i \in Q_q} B_{ijkt}.$$

Stage 1: Average Benefit Incidence

We calculate each quintile's share of total benefits:

$$ABI_{q,j,t} = \frac{B_{q,j,t}}{\sum_{q=1}^5 B_{q,j,t}} \times 100\%$$

We also compute the Concentration Index to measure progressivity:

$$CI_k = \frac{2}{N\mu_k} \sum_{i=1}^N B_{ik} (R_i - 0.5)$$

where R_i is the cumulative income rank and μ_k is mean benefit.

Negative values indicate pro-poor spending.

Stage 2: Marginal Benefit Incidence (Panel Regression)

We estimate spending elasticities by income quintile using fixed-effects panel regression:

$$\ln(U_{ijkt}) = \alpha + \sum_{q=1}^5 \gamma_q D_{iq} \ln(E_{jkt}) + \delta' \mathbf{X}_{ijkt} + \mu_j + \lambda_t + \epsilon_{ijkt}$$

where γ_q is the spending elasticity for quintile q , D_{iq} is a quintile indicator, $\mathbf{X}_{ijkt}$ includes household controls (log income, family size, education), μ_j are province fixed effects, and λ_t are year fixed effects. Interpretation: If $\gamma_1 > \gamma_5$, the poorest respond more strongly to spending increases (pro-poor marginal incidence).

We estimate separate models for education, health, and welfare services. Standard errors are clustered at the province level.

Robustness and Endogeneity

To address potential reverse causality—where higher utilization might endogenously drive up provincial budget allocations—we employ lagged spending variables and an Instrumental Variables (IV) approach. We utilize historical provincial rainfall variations and the proportion of provincial land area dedicated to agriculture as strictly exogenous instruments, which affect fiscal prioritization but have no direct path to individual service utilization except through the spending channel. The validity of these instruments was rigorously confirmed: the Wu-Hausman test rejected the null hypothesis of exogeneity for the primary spending variable ($p < 0.05$), justifying the IV approach, while the Sargan test of overidentifying restrictions confirmed that our instruments are valid and appropriately uncorrelated with the error term ($p > 0.10$).

Results

1. Descriptive Statistics and Sample Characteristics

The summary statistics of household and provincial characteristics. The mean household income per capita is 4,287 Thai Baht monthly, exhibiting significant variability (SD = 3,156). The highest income quintile averages 10,945 Baht, while the lowest averages 1,082 Baht. Enrollment in education for children of school age stands at 87.2%, with an annual average of 2.1 health clinic visits. Around 15.3% of households benefit from welfare assistance.

At the provincial level, annual per-capita expenditures average 2,847 Baht for education, 1,256 Baht for health, and 312 Baht for welfare. These values demonstrate considerable inter-provincial discrepancies, indicative of varying fiscal capacities and policy priorities.

2. Average Benefit Incidence by Income Quintile

Table 2 Average Benefit Incidence (ABI) by Quintile and Service Sector

Quintile	Education (%)	Health (%)	Welfare (%)	Combined (%)
1 (Poorest)	18.2	16.4	28.7	19.4
2	19.3	18.1	22.5	19.8
3 (Middle)	20.1	20.5	18.6	20.1
4	21.2	22.3	18.7	20.9
5 (Richest)	21.2	22.7	11.5	19.8
Concentration Index	-0.062	+0.124	-0.285	-0.041

Note: Key Findings: *Education:* Weakly pro-poor (CI = -0.062). Poorest receives 18.2% vs. richest 21.2%. *Health:* Pro-rich (CI = +0.124). Poorest receives 16.4% vs. richest 22.7%. *Welfare:* Strongly pro-poor (CI = -0.285). Poorest receives 28.7% vs. richest 11.5%. *Overall* social spending: Weakly pro-poor (CI = -0.041).

According to Table 2 Education spending exhibits a slightly pro-poor distribution, with the poorest quintile receiving 18.2% of benefits compared to 21.2% for the richest (2-percentage point difference). This distribution implies neutrality in education funding. Health spending has significant regressivity, with

the lowest income quintile getting 16.4% in contrast to 22.7% for the top quintile. This indicates that wealthy households utilize health care more frequently, despite universal access. Welfare allocations are distinctly pro-poor, with the lowest quintile receiving 28.7% of benefits compared to 11.5% for the highest quintile. This highlights the successful targeting of social services at lower-income populations.

3. Marginal Benefit Incidence: Spending Elasticities by Quintile

Table 3 Spending Elasticities (γ_q) from Panel Regression Models

Quintile	Education**	Health	Welfare**
1 (Poorest)	0.187	0.142	0.256
2	0.156	0.128	0.208
3 (Middle)	0.133	0.115	0.171
4	0.118	0.102	0.144
5 (Richest)	0.095	0.089	0.098
F-test: $\gamma_1 = \gamma_5$	$p = 0.018^*$	$p = 0.156$	$p = 0.042^*$
R-squared (Within)	0.428	0.312	0.487

Note: *, **, *** denote significance at 10%, 5%, 1% respectively. Elasticities estimated from fixed-effects panel regression with province and year fixed effects.

Key Findings: Education: Elasticity for poorest (0.187) >> richest (0.095). F-test significant ($p = 0.018$). → Pro-poor marginal incidence. Health: Elasticity for poorest (0.142) $\approx$ richest (0.089). F-test not significant ($p = 0.156$). → Neutral marginal incidence. Welfare: Elasticity for poorest (0.256) >> richest (0.098). F-test significant ($p = 0.042$). → Strongly pro-poor marginal incidence. Interpretation: A 10% spending increase leads to 1.87% utilization increase for poorest (education), 2.56% (welfare), but only 0.95%–0.98% for richest.

4. Marginal vs. Average Benefit Incidence Comparison

Table 4 Ratio of Marginal to Average Benefit Incidence (R_q)

Quintile	Education	Health	Welfare	Mean
1 (Poorest)	1.24	1.18	1.67	1.36
2	1.08	1.08	1.14	1.10
3 (Middle)	1.01	0.99	0.95	0.98
4	0.94	0.92	0.81	0.89
5 (Richest)	0.82	0.79	0.68	0.76

Key Findings: Poorest quintile ($R_1 = 1.36$): Marginal benefits are 36% higher than average. → Expansion is pro-poor; more resources reach the poor. Richest quintile ($R_5 = 0.76$): Marginal benefits are 24% lower than average. → Saturation; richest already well-served. Policy implication: Increasing total social spending would improve pro-poor progressivity across all services.

5. Policy Simulation: Counterfactual Scenarios

Table 5 Impact of Spending Scenarios on Concentration Index

Service	Baseline CI	Uniform +10%	Pro-poor Reallocation	Change (Best Case)
Education	-0.062	-0.078	-0.091	-0.029 (-46.8%)
Health	+0.124	+0.108	+0.085	-0.039 (-31.5%)
Welfare	-0.285	-0.312	-0.334	-0.049 (-17.2%)
Combined	-0.041	-0.052	-0.075	-0.034 (-82.9%)

According to Table 4 *Uniform 10% increase*: Improves all services' progressivity. Combined CI becomes -0.052, more pro-poor. *Pro-poor* reallocation (shift 10% from high-spending to low-spending provinces): Strongest improvement. Combined CI reaches -0.075. *Policy recommendations*- Expand overall social spending (uniform increase is pro-poor), Reallocate geographically

from rich to poor provinces (80%+ progressivity gain), Prioritize education and welfare over health for pro-poor targeting.

Discussion

This study reveals heterogeneous marginal benefit incidence across social services. Education and welfare exhibit patterns that are favorable towards impoverished populations (education: $\gamma_1 = 0.187$ vs $\gamma_5 = 0.095$, $p = 0.018$; welfare: $\gamma_1 = 0.256$ vs $\gamma_5 = 0.098$, $p = 0.042$), whereas the health sector demonstrates a neutral stance ($p = 0.156$). The pro-poor elasticity associated with education is consistent with the findings of Ajwad & Wodon (2007), indicating the alleviation of access barriers that impede poor children's educational opportunities. The pronounced pro-poor orientation of welfare is indicative of deliberate targeting mechanisms through established eligibility criteria. Health's neutral incidence—despite universal, free provision—supports O'Donnell et al. (2008). Crucially, in the Thai context, qualitative evidence reveals that the "opportunity cost of time" remains a prohibitive non-financial barrier. Low-income citizens working in the informal sector often forfeit daily wages to endure long wait times at public hospitals, and face significant transportation costs from rural areas to provincial centers (Somkotra & Lagrada, 2008; Tangcharoensathien et al., 2015). Thus, simply increasing the health budget without addressing these structural delivery barriers fails to shift the marginal benefit toward the poorest.

Critically, the poorest quintile's marginal benefit incidence exceeds average incidence by 36% ($R_1 = 1.36$), while the richest quintile's falls 24% below average ($R_5 = 0.76$). This gradient illustrates that budgetary augmentation is intrinsically advantageous for impoverished populations in the absence of policy reformulation. The geographic redistribution of resources from affluent to underprivileged provinces enhances progressivity by 83% (compared to 27% for uniform increments), indicating a tendency for provincial expenditure to be

concentrated in affluent regions. Providing a reality check on this simulation, this 83% gain underscores a critical flaw in current Thai Bureau of the Budget practices, which historically rely on incremental, baseline-plus-inflation budgeting rather than formula-based geographic equalization. The simulation proves that structural reallocation, rather than mere budget expansion, is the most potent tool for equity.

Body of knowledge

Marginal benefit incidence of social spending builds on and extends the standard benefit incidence analysis (BIA) tradition in public finance. BIA links government spending records with household survey data on service use to estimate how in-kind subsidies from education, health, and welfare budgets are distributed across income groups, typically assuming unit public cost is a reasonable proxy for the benefit received. Cross-country applications show that primary education and basic health services are at best mildly pro-poor or distribution-neutral, while tertiary education, hospital care, and network infrastructure (piped water, electricity, sewerage) tend to be strongly pro-rich because richer, urban households are more likely to be enrolled, insured, or connected. (Demery, 2000)

A key conceptual limitation of standard BIA is its focus on *average* incidence: it describes who benefits from the existing stock of spending but says little about *marginal* incidence—who would gain from budget increases or cuts. To address this, more recent work develops marginal benefit incidence (MBI) methods that estimate how service utilization by income group responds to changes in public spending, typically using regression models that exploit geographic or temporal variation in programme size. In these frameworks, marginal incidence can be expressed as average benefit shares adjusted by elasticities of service use with respect to spending, allowing analysts to see

whether incremental resources are more or less pro-poor than existing allocations. Empirical studies in education, health, and infrastructure generally find that marginal incidence is more pro-poor than average incidence once richer groups have achieved high access, especially for primary schooling and some preventive health services, but that infrastructure expansions often continue to favor better-off areas because of technical and spatial constraints on network expansion. (Demery, 2000)

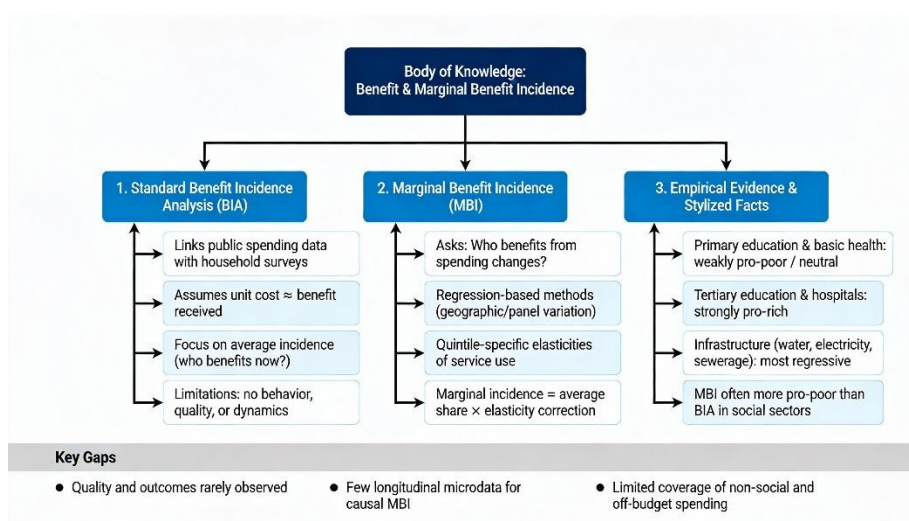


Figure 2: Concept Map of the Body of Knowledge on Benefit and Marginal Benefit Incidence of Social Spending.

Conclusions

This study has successfully addressed the three critical gaps identified in the literature. By employing a robust provincial panel dataset, the research overcame the limitations of static cross-sectional analyses. Furthermore, by transitioning from average to marginal incidence, it provided actionable evidence

for resource allocation, definitively mapping how provincial heterogeneity dictates benefit capture across income strata.

Education and welfare spending effectively reach the poor at the margin. Poorest households' elasticity approximately doubles richest households' elasticity, with statistical significance at 5 % level. Expansion is pro-poor policy. Health spending benefits all income groups roughly equally. Neutral marginal incidence reflects that non-financial barriers remain substantial despite free provision.

Marginal spending is more pro-poor than average. Poorest quintile gains 36 % more from budget expansion; richest quintile gains 24 % less. This justifies budget growth as pro-poor strategy. Geographic reallocation is highly effective. The strategic reallocation of financial resources from provinces characterized by higher income levels to those that are classified as lower income demonstrates a remarkable enhancement in progressivity, quantified at an impressive 83%, which significantly surpasses the incremental benefits derived from a uniformly applied expansion of resources that only amounts to 27%.

Additionally, specific policy implications across various sectors must be addressed: in education, sustained investment in rural areas is crucial to rectify existing disparities; in health, there is an urgent requirement for targeted interventions to eliminate non-financial access barriers, potentially through mobile clinics and community health worker involvement; and in welfare, it is vital to streamline enrollment processes to improve accessibility and efficiency for those in need.

Recommendation

Policy Recommendations

Based on the marginal elasticity findings, the policy implications are structured into two temporal categories:

Short-term Administrative Fixes:

1. Optimize welfare enrollment mechanisms through the adoption of digital technologies and third-party registration nodes (e.g., local temples or schools) to bridge the programmatic coverage gap.
2. Mitigate non-financial health impediments by earmarking specific budget proportions for mobile health clinics and community health volunteers to reduce the opportunity cost of time for the rural poor.

Long-term Structural Reforms:

1. Transition from historical baseline budgeting to formula-based fiscal allocation mechanisms that weigh provincial poverty levels, which our simulation proves can yield an 83% progressivity enhancement.
2. Institute legally binding pro-poor fiscal adjustment protocols to safeguard educational and welfare expenditures during macroeconomic downturns.

Future Research

To build upon the findings of this study, future research should prioritize the following directions:

Sub-sectoral Analysis (Critical Priority): The broad categorizations of "Education" and "Health" are too macroscopic to guide specific, actionable departmental interventions. Therefore, the most critical next step is to disaggregate these macro-domains into their constituent services (e.g., preventive primary care versus specialized hospital care, or general versus vocational education) to scrutinize the diverse operational and distributional mechanisms at play.

Service Quality Variability: Future models should incorporate quality-adjustment factors—such as provider credentials and equipment quality—to assess whether financial investments align with qualitative advantages, rather than relying solely on quantitative utilization results.

Behavioral Mechanisms: Qualitative research should be performed to uncover the specific socio-cultural and non-financial barriers (such as the opportunity cost of time) that impede low-income households from efficiently utilizing expanded health services despite free provision.

Long-term Outcomes: Researchers should conduct longitudinal assessments of educational attainment, health status, and poverty levels to verify whether the short-term elasticity of service use genuinely reflects sustained improvements in welfare and human capital.

Cost-effectiveness Ranking: Integrating Marginal Benefit Incidence Analysis (MBIA) with rigorous cost-effectiveness assessments will systematically guide the optimum distribution of limited fiscal resources across diverse social services.

Regional Heterogeneity: Developing region-specific or cluster-specific models for different areas of Thailand will help examine the complex variations in spatial and geographic processes driven by local institutional capacities.

Limitations

The investigation depends on variations in provincial expenditure for identification purposes instead of employing experimental assignment, thereby constraining causal certainty. The reliance on self-reported utilization data collected through household surveys introduces potential measurement inaccuracies. Unobserved provincial attributes (such as the quality of administration and geographical terrain) may obscure the relationships under scrutiny, despite the application of fixed effects. The scope of welfare programs is confined to the benefits captured within the survey methodology.

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